Maryland Historical Trust
Determination of Eligibility Form

Property Name: Bloede's Dam **Inventory Number:** BA-1587

Address: on Patapsco River between Avalon and Ilchester **Historic District:** ____ Yes X No

City: Avalon **Zip Code:** ____ **County:** Baltimore County

USGS Quadrangle(s): Savage

Property Owner: Maryland Department of Natural Resources **Tax Account ID Number:** ____

Tax Map Parcel Number(s): ____ **Tax Map Number:** ____

Project: ____ **Agency:** Maryland Department of Natural Resources

Agency Prepared By: Paula S. Reed & Associates, Inc.

Preparer's Name: Edie Wallace **Date Prepared:** 02/09/2011

Documentation Is Presented In: Hnedak, John. "Bloede's Dam/Patapsco Dam." BA-1587, Maryland Inventory of Historic Properties, 1978-79.

Preparer's Eligibility Recommendation: X **Eligibility Recommended** ____ **Eligibility Not Recommended**

Criteria: X A X B X C __ D **Considerations:** __ A __ B __ C __ D __ E __ F __ G

Complete if the property is a contributing or non-contributing resource to a NR district/property:

Name of the District/Property: ____

Inventory Number: ____ **Eligible:** __ Yes **Listed:** __ Yes

Site Visit by MHT Staff: __ Yes __ No **Name:** ____ **Date:** ____

Description of Property and Justification: ***(Please attach map and photo)***

Description:

Bloede's Dam crosses the Patapsco River in the Avalon section of Patapsco Valley State Park just southwest of Baltimore. The river divides Howard and Baltimore Counties. In this location the River bends in a C-shape, flowing south to southwest then east, and follows a channel between steep hills on either side. The B&O Railroad, runs along the east side of the river, entering a tunnel just above the dam site on the Baltimore County side of the River. The railroad emerges from the tunnel and crosses to the west side of the river a short distance upstream, near the site of the former Thistle Mills. The tunnel is a later railroad development, constructed after 1913. The original rail bed followed the river's edge. That right of way is now a park hiking trail. On the west, Howard County side of the river, a park road provides access to the dam. This road was once a public road leading to the village of Ilchester and Thistle Mills, the site of a former cotton mill and associated workers' housing. Because of the pronounced bend in the river just before the location of Bloede's Dam, the dam itself is oriented with its ends north (east bank, Baltimore Co. side) and south (west bank, Howard Co. side).

Built in 1906 for the Patapsco Electric and Manufacturing Company, the dam consists of flat slabs of reinforced concrete with a

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Jonathan Sager — 4/21/11
Reviewer, Office of Preservation Services **Date**

[signature] — 4/20/11
Reviewer, National Register Program **Date**

201100780

hollow interior which held electrical generating machinery. Thus the power plant for this hydro-electrical generating facility occupies the inside the dam itself, under the surface level of the water. The Ambursen Hydraulic Construction Company designed and built the dam. According to a 1907 description of the then-new dam, (see "Power plant Inside of a Dam on the Patapsco River," Electrical World, August, 1907, p. 207-210) it has a total length of 230 feet, is 26 ½ feet high from the downstream water level to its top, and 40 feet broad at the base. Buttresses at each end of the dam rise 10 feet above the crest and include ground level entrances on either end, providing access to the interior of the dam. Of the dam's 230-foot length, the spillway portion is 168 feet. A series of 19 buttresses placed 12 feet apart, support the dam's sloping upstream surface. Each buttress tapers from 24 inches thick at the base to 16 inches thick at the top. The shell of the dam is 18 inches thick at the base and decreases to 10 inches thick at the top. As built, the dam was equipped with anchor bolts along the spillway to allow the height of the dam to be raised temporarily by attaching upright boards across the top of the spillway. Openings in the upstream surface of the dam fed water into turbines inside the dam.

On the downstream side of the dam, the apron extends only partway down from the crest, flaring slightly where it ends, to kick the water away from the lower dam wall bays. Two round, 22-inch porthole windows per bay illuminated the interior of the dam where the electrical power generation took place. The kick in the dam's apron caused the water to project outward and away from the windows.

On the west bank (Howard Co. side) of the river, a concrete fish ladder uses a switchback design to allow fish to climb to their spawning area above the dam. The ramped trough has a steel grate cover and a steel railing to provide a walking surface for observation and maintenance purposes. The current fish ladder replaces an older wooden one that was part of the original construction. A large concrete pipe conduit extends from the north end (Baltimore Co. side) of the dam, supported by concrete piers, and continues down river for some distance.

Currently the interior of the dam is empty and dark. The electric generating equipment was removed after 1932 when the hydroelectric plant closed. Also currently the crest of the dam is level continuously across the river, and this was the appearance as constructed. However, in a 1914 photograph of the dam, two superstructures had been added on top of the dam's crest, approximately over the turbines. They were destroyed in 1972 by hurricane Agnes.

Although its condition is deteriorated, the dam is intact and appears much as it did as constructed in 1906.

Assessment of Integrity:

Bloede's Dam retains outstanding integrity of location, setting, design, materials (except for power plant equipment), workmanship, feeling and association. It appears today very similar to photographs taken shortly after construction in 1907.

Statement of Significance:

Bloede's Dam is significant under NR Criterion A for its role in the early 20th century generation of electricity in Baltimore County. Bloede established the Patapsco Electric & Manufacturing Company in 1906 and built the hydro-electric dam that

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bears his name to provide electricity to his Eden Terrace development adjoining Catonsville and the surrounding area in Baltimore County not yet serviced by the Consolidated Gas Electric Light & Power Company of Baltimore.

Bloede's Dam is significant under NR Criterion B for its association with Victor Gustav Bloede, who, as president of the Patapsco Electric & Manufacturing Company, financed the construction of the dam to provide electrical power to his Eden Terrace development and the surrounding rural area outside of Baltimore City. Victor G. Bloede was a chemical engineer who developed the "sun-fast" chemical dying process for textiles, a vegetable glue known as "Viscamite," a cellulose plastic known as "Viscolite," and also invented the adhesive used on U.S. postage and revenue stamps through the 1980s.

Bloede's Dam is significant under NR Criterion C as the first hollow concrete hydroelectric dam ever built in which the electrical generating equipment was housed within the dam interior. Although the hydroelectric plant ceased operations in 1932 and the equipment was removed, the dam structure itself remains largely intact and retains the ability to convey the significance of its design and construction.

The period of significance runs from 1906 when the dam was constructed through 1932 when the dam ceased operations as a hydroelectric production facility.

Historic Context:

Dam Construction and Hydroelectric Power

The construction of dams to create a reservoir of water dates back to early history. Writing initially in 1888, Civil Engineer Edward Wegmann observed: "The ordinary manner of forming these basins, some of which were of vast extent, consisted in closing a valley by dams of earth; and it was not until comparatively recent times that walls of masonry were employed for such purposes." (Wegmann, p. 1) Just twelve years later James Dix Schuyler issued a second edition of his own treatise on dam construction, noting in the new 1908 preface: "In the past ten or twelve years...the world in general appears to have entered upon a new era of dam and reservoir creation, and there has been such a remarkable degree of activity displayed in the conservation and utilization of water, that it may be quite reasonable to state that more dams have been built in the decade just passed than during any fifty years of previous history." Significantly, Schuyler's second edition added a new chapter "descriptive of reinforced concrete dams, the latest claimant to public attention..." (Schuyler, p. v).

It was in 1902, according to Schuyler, that the Ambursen Hydraulic Construction Company of Boston first introduced their patented designs for reinforced concrete dams in the eastern United States (Schuyler, p. 465). Within six years "No less than 39 dams, from 10 to 80 feet high, and from 60 to 1200 feet long, have been erected in this short interval..." (Ibid) Clearly impressed with the strength and versatility of the concrete dam, Schuyler wrote: "The designs for these dams are highly specialized and exhibit an intelligent conception of the problems involved. They also illustrate in a striking way the manifold uses and flexible adaptability of the new building material which is so rapidly entering into all forms of construction at the present day." (Ibid)

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The new design apparently perfected in concrete by the Ambursen company in fact harkened back to the old triangular design of timber crib dams rather than the more vertical masonry dams. The dam was given a "long low back slope" the surface over which the dammed water produced "the vertical component of the static pressure...made to pin the dam more firmly down to its foundation." The strength of the reinforced concrete material also allowed the Ambursen design to utilize a base consisting of a series of buttresses, rather than the solid core of the typical masonry dam. According to Schuyler, "One apparent advantage of this design is that the dam when founded on rock has no continuous base, and therefore cannot be threatened by upward lifting pressure of water that may find its way through seams in the rock." (p. 467) Schuyler continued: "The design of these dams leaves them hollow, which has the advantage of permitting inspection of the interior. At the same time, the space can be utilized for handling flashboards, waste gates, log sluices, or movable crests from beneath safely and conveniently, and a passageway can be maintained through the interior of the structure from one side of the river to the other, as a substitute for a foot-bridge over the stream." (pp. 470-471).

Much of the world's dam construction up to the late 19th century had been for the collection of water for irrigation. But in 1882, following recent advances in electrical production, the first hydroelectric plant was constructed in Wisconsin and in 1896 Niagra Falls began generating electrical power (Wisconsin Historical Society, "Introduction of Electrical Power," www.wisconsinhistory.org/turningpoints/tp-041/?action=more_essay). Schuyler wrote of the advent of hydroelectric generation: "The recent development of electrical machinery, by which power may be profitably transmitted long distances with comparatively small loss, has indirectly benefited the irrigation development of the country by adding an incentive to the construction of storage reservoirs for the primary and more profitable purpose of generating power" (Schuyler, p. xi; this book was first published in 1901). Indeed, by the early 20th century, 40% of U.S. electricity was generated by hydroelectric plants: "Niagra Falls was the first of the American hydroelectric power sites developed for major generation and is still a source of electric power today. The early hydroelectric plants were direct current stations built to power arc and incandescent lighting during the period from about 1880 to 1895. When the electric motor came into being the demand for new electrical energy started its upward spiral. The years 1895 through 1915 saw rapid changes occur in hydroelectric design and a wide variety of plant styles built." (U.S. Bureau of Reclamation, "The History of Hydropower Development in the United States," www.usbr.gov/power/edu/history.html)

Hydroelectric plants and their associated dams were typically connected but constructed as separate structures. The hollow core design of the Ambursen reinforced concrete dam provided interior space within the dam that could potentially house the power plant. The first of this type of hydroelectric dam, and the smallest at only 26 1/2 feet high, was built in 1907 on the Patapsco River for the Patapsco Electric & Manufacturing Company (see Resource History below). This was followed in 1907-08 by the larger (71 1/2 feet high) Ellsworth Dam on the Union River in Maine (Schuyler, p. 471). This proved to be a cost and space-saving option, but appears to have been rarely adopted in hydroelectric dam construction.

Electric Generation in Baltimore County

"On Tuesday evening, June 11, 1816, Rembrandt Peale illuminated a room in his Holliday Street museum in Baltimore with burning gas, dazzling the patrons gathered there with a 'ring beset with gems of light'." (www.bge.com) Within days, Peale, the son of the famous American portrait artist Charles Willson Peale, and two business partners established the Gas Light

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Company of Baltimore, providing manufactured gas to light the streets and homes of Baltimore City. By 1888, after facing fierce competition from rival gas companies, the company acquired its competitors and formed the Consolidated Gas Company of Baltimore.

By then Thomas Edison had invented the incandescent light bulb and early electrical generation plants were already in service. By the close of the 19th century, Baltimore City was serviced by several electric companies, but "Power plants were small and inefficient, rates varied widely, and distribution amounted to a tangle of duplicated and overloaded overhead lines." (www.bge.com) In 1906, United Electric Light and Power Company merged with Consolidated Gas and formed the Consolidated Gas Electric Light & Power Company of Baltimore, "the city's first fully integrated gas and electric service company." (www.bge.com)

At the same time through the 1880s and 1890s, Baltimore City and County was at the forefront of experimentation with electric railways. Numerous lines ran through the city and threaded out to surrounding suburbs, including the Catonsville & Ellicott Mills Railway Company, and by 1899 all were consolidated as the United Railways & Electric Company of Baltimore (Hall, Vol. I, p. 550). In 1900 the Company built a large power plant on Pratt Street in Baltimore which provided electrical power to the railway system. By 1904, according to the Sanborn Fire Insurance Company map, Catonsville had public electric lights. Presumably the electricity reached this suburban town through the passenger railway line.

In 1906 the United Railway & Electric Company merged with Consolidated Gas Electric Light & Power Company of Baltimore, bringing with it the Pratt Street power plant. Consolidated already had recently completed its massive power plant, the Westport Power Station built in 1905 (www.westportpartnerships.org). In 1907 the company acquired the Gould Street Generating Station among the assets that came with the Baltimore Electric Company and in 1910, began generating power at the Holtwood hydroelectric plant on the Susquehanna River, acquired by Consolidated president John E. Aldred when he took receivership of the McCall's Ferry Power Company (N. Christian Porse, July 2, 2010, HydroWorld.com).

Even with the developing electrical generating capacity of Consolidated Gas Electric Light & Power Company through the first decade of the 20th century, most rural areas of Baltimore County were left behind. Some towns, like Catonsville, were likely serviced through the electric railway connection. Victor G. Bloede, whose wealth and inventors spirit enabled him to pursue his own power source (see Resource History below), brought electricity to his rural community and the surrounding area in 1908. After World War I, the Baltimore City boundary was expanded by nearly 60-square miles to include many of its now-dense suburban neighborhoods, bringing electrification in its wake (www.bge.com).

Resource History:

Victor G. Bloede (pronounced Blerda) was born in Dresden, Germany in 1849 and immigrated with his parents to the United States before the Civil War. The family settled in Brooklyn, New York where young Victor attended Cooper Union (Institute). He graduated in 1867 among the first class to receive a degree in chemical engineering. That same year Bloede published The Reducers Manual, and Gold & Silver Workers Guide, Being a Complete and Practical Hand-Book on the Saving and Reduction

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of every Class of Photographic Wastes and Gold & Silver Residues. (New York: Joseph H. Ladd Publisher, 1867) Bloede's career began at a small chemical company in Brooklyn. He then moved to Ohio, eventually becoming a partner in the Parkersburg, West Virginia firm of Bloede & Rathbone. There he learned the trade of textile dyes and helped to develop a manufacturing process for the production of nitrobenzene. In 1877, Bloede moved to Baltimore, Maryland where he established his own company, Victor G. Bloede Company, and began the development of textile dye compositions among numerous other inventions: "between the years 1890 and 1895 he was granted fifteen or twenty patents upon chemical processes, one of the most important being the patent upon the process for dyeing in 'sun-fast', unfading shades." (Hall, p. 616) Other patents included a vegetable glue called "Viscamite," a cellulose plastic called "Viscolite" (V.C. Bloede, index), and an adhesive known as dextrin used on U.S. postage stamps and revenue stamps until they switched to the self-adhesive in the 1980s (Smith and Hamilton, Chemical Engineering News, 1944, 22 (17), p 1482). In 1894, Bloede was awarded the Edward Longstreth Medal in engineering from the Franklin Institute for his "process of tinting fabrics." (www.fi.edu/winners/detail.faw?winner_id=2349; Amer. Men of Science p. 68)

In 1892 Bloede established the Eden Construction Company and laid out the Eden Terrace community adjoining Catonsville in Baltimore County (plat, BC Plat Bk JWS 1/82). Carl Shon Sr. (Bloede's father-in-law, a metallurgist/jeweler/architect) and William Lightfoot Price (Philadelphia architect) designed a number of the houses and "cottages" in the 57-lot community, including Bloede's own remarkable stone mansion called Arden, which burned in 1922.

It was in 1906 that Victor G. Bloede decided to bring electricity to his Eden Terrace community and the surrounding rural Baltimore County area. Although Catonsville had electricity as early as 1904 (Sanborn Insurance Co. map), it appears that the surrounding rural area was still unserviced by the newly-formed Consolidated Gas Electric Light & Power Company of Baltimore. Bloede established the Patapsco Electric & Manufacturing Company and purchased a "water privilege" on the Patapsco River near the site of Grays Mill and the old Thistle Mills near Ilchester (Water & Water-Power Rights' Assessment). Immediately the Company, with Bloede as President, contracted a design for a state-of-the-art hydro-electric dam from the country's leading concrete dam-building company at the time, Ambursen Hydraulic Construction Company of Boston. Construction was completed in 1907 and it was immediately lauded in the August 3 issue of the industry publication Electrical World as the "first of its kind":

"The Patapsco Electric & Manufacturing Company, of Ellicott City, Md., has lately completed its new dam and power house on the Patapsco River near Ilchester Branch of the Baltimore & Ohio Railroad. The plant is unique in that it is placed within the dam and is thus completely under water. The plant also has the distinction of being the first of its kind ever built, and the cost is of course very much less than that of any other arrangement."

The article went on to describe the dam and power plant in detail:

"The dam has a total length of 220 ft. and is 40 ft. wide at the base. The height of the dam from normal tail water to the crest is 26 ½ ft. At each end the buttresses and deck of the dam rise 10 ft. above the spillway as a protection from floods and to afford convenient entrances to the interior of the dam. The spillway is 169 ft. long and is provided with anchor bolts so that if at any time it may be deemed desirable, flash boards may be bolted to them and the available head increased two feet. The back

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water extends ¾ of a mile with an average width of about 500 feet to the tail waters of a cotton mill located at Ilchester. The dam is built of reinforced concrete and the 'deck' is supported by 19 buttresses 24 ins. thick at the bottom and 16 ins. thick at the top, which are placed 12 ft. apart. The mixture used was 1:3:6. The edges of the buttresses and of the openings are reinforced with ¾ in. corrugated iron rods in groups of three. The shell of the dam is 18 ins. thick at the bottom and tapers to 10 ins. at the top. The concrete in the deck is a 1:2:4 mixture reinforced with ¾ in. corrugated iron bars at graduated distances down to 4 ½ -in. centers. The apron extends only half way down from the crown, the remaining down-stream portion being entirely open and provided with windows by means of which the interior is lighted. The shape of the apron is such that the water is thrown some little distance away from the windows. On a clear day the illumination is all that could be desired; while during rainy weather, at which time the water is muddy, the illumination is not quite so good...

At present only 108 feet of the dam is used for housing the power plant. This part of the dam is fitted with a false ceiling hung five feet from the inside of the dam so as to protect the apparatus from any water that might seep through the outer shell of the dam. The dam is built of a fine and rich mixture which was laid very wet. Aside from this no precautions were taken to eliminate water. The ceiling slopes until it reaches the vertical sides forming the power house. That portion of the dam not protected with the false ceiling is comparatively dry as very little water percolates through. What little water finds its way through the concrete trickles along the under side to the drain at the bottom. Were it not for this moisture a person within the power house would not be conscious that he was beneath the water. The waste water going over the crest of the dam is carried on the apron of the spillway to within 16 ft. of the tail water. This apron causes the water to fall about 20 ft. from the down-stream side of the dam and as the river bed is quite rocky at this point, no appreciable pitting takes place.

A fish ladder is placed at one side of the dam as required by law. This is 125 ft. long and has the proper slope and fins so that fish can easily go from the tail water to that above the dam. The wooden trough is shown at the entrance to one side of the dam. It might be well to state in passing that the reason for insisting on fish ways in dams is that when the fish spawn they go up stream to the head waters. To reach the water above the dam they jump from fin to fin of the fish ladder until they reach the top."

The power plant equipment included "two 34-in. horizontal, Leffel [James Leffel & Co., Springfield, Ohio] water-wheels fitted with Woodward governors," connected to "an Allis-Chalmers 300-kw, 11,000-volt, three-phase, 60-cycle alternator belted to the shaft." The apparatus sat on the concrete and steel floor "placed at a proper elevation above the lower pool." Large steel pipes in the up-stream side of the dam fed water directly to the turbines. The water was then "discharged by draft tubes into the base of the dam, dropping into a well sunk some three feet below the river bed," and out of the dam via a channel dug into the river bed.

"...The advantages of such an arrangement of water-wheel and generator are readily discerned. The dam foundation and structure are the power house; the chamber is free from moisture by reason of the free circulation of air around it and the development utilizes all the available fall.

The entire electrical installation is compact, secure, and of the highest efficiency so far as it can be obtained from flow and fall. It will be appreciated that the water falls directly through the top of the dam into and through the wheels below, thus avoiding the friction and other losses of power resulting from carrying the water through long race ways to the wheels. The difference between the present system and those already in vogue may be likened to direct-driven and belt-driven machinery."

The article listed the Ambursen Hydraulic Construction Company as the designer and builder of the dam, along with consulting

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hydraulic engineer H. Von Schon of Detroit and electrical engineers "Messrs. Newton and Painter, of Baltimore."

According to a 1933 assessment, the power plant at Bloede's Dam required three men to operate under normal conditions. In 1913, after an extended lawsuit between Victor G. Bloede (on behalf of Patapsco Electric) and Consolidated Gas Electric Light & Power Co., the Patapsco Electric & Manufacturing Co. leased, then sold the dam and power plant in 1916 to Consolidated Gas Electric Light & Power Company of Baltimore (report on the Maryland Public Service Commission, Electrical World, Vol. 61, No. 13, March 29, 1913). Apparently the sale was not official until 1928, when Consolidated "acquired all property and assets of Patapsco Electric & Manufacturing Co." (Water Privilege report, 1933). The power plant ceased operations in March 1932 and the equipment was removed from the dam.

Victor Gustav Bloede died in 1937 at the age of 88, according to his New York Times obituary, still active to the end as the president of his dye (ink) manufacturing company.

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Determination of Eligibility
February 2011

Bibliographic Resources:

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"Power Plant Inside of a Dam on the Patapsco River." *Electrical World*, Vol. L, No. 5, August 3, 1907, pp. 207-210.

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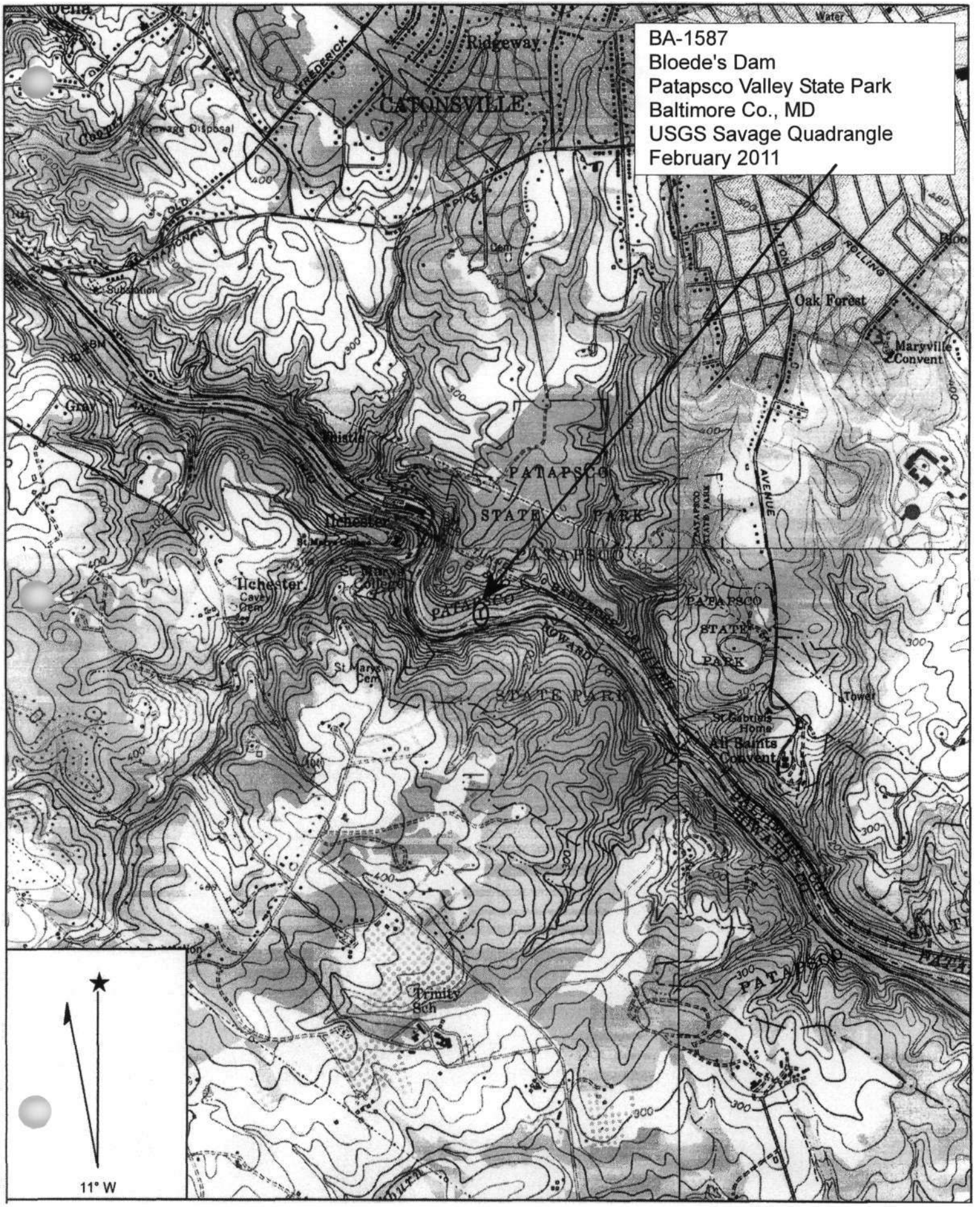
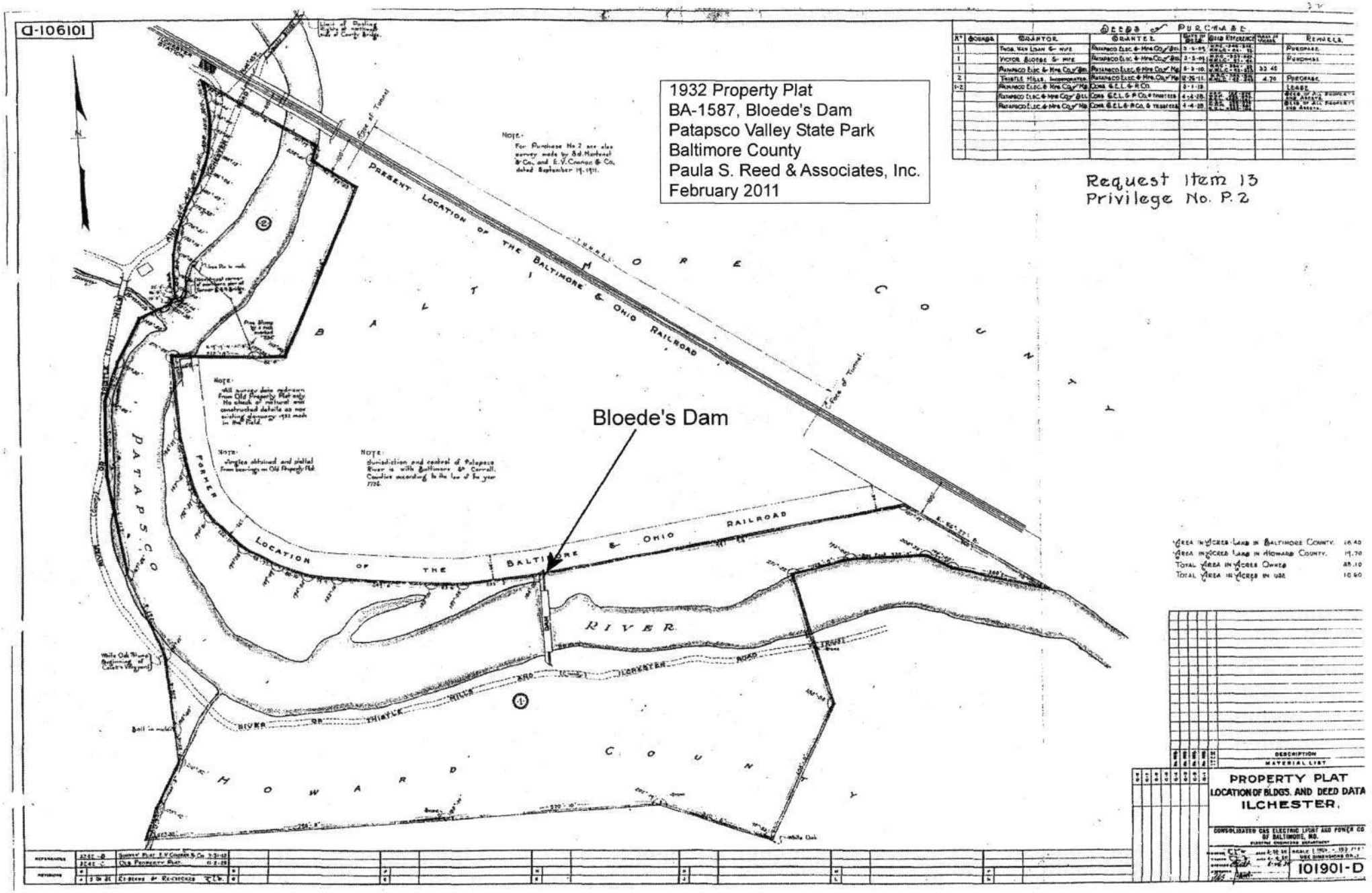
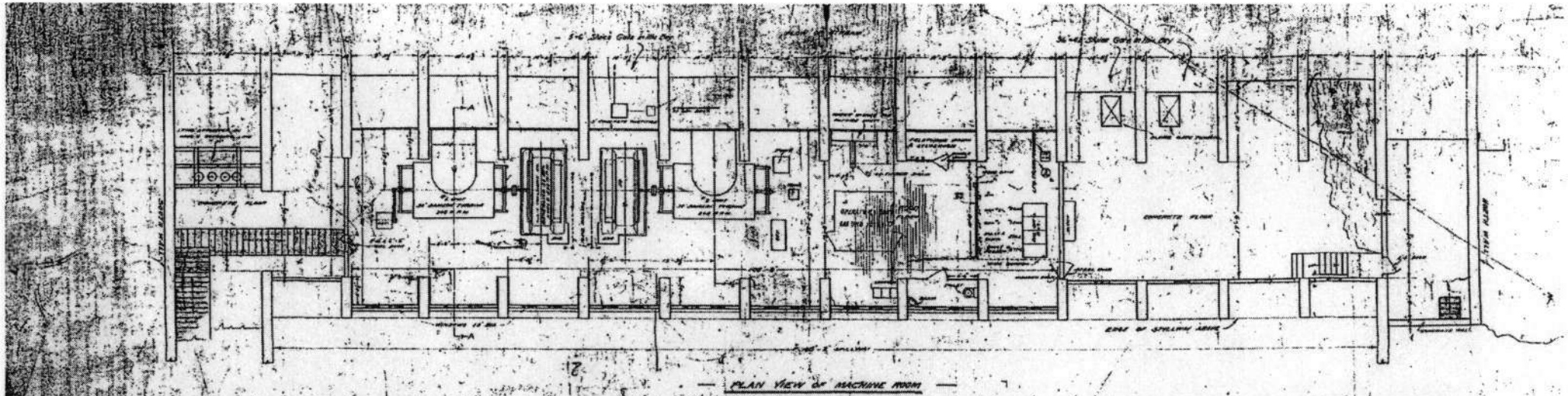

BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co., MD
USGS Savage Quadrangle
February 2011
Ridgeway
CATONSVILLE
Oak Forest
Maryville Convent
PATAPSCO STATE PARK
Ilchester
St Mary's College
St Mary's Cem
Ilchester Cave Cem
Gray
Whistle
Tower
St Gabriel's Home
All Saints Convent
Trinity Sch
11° W

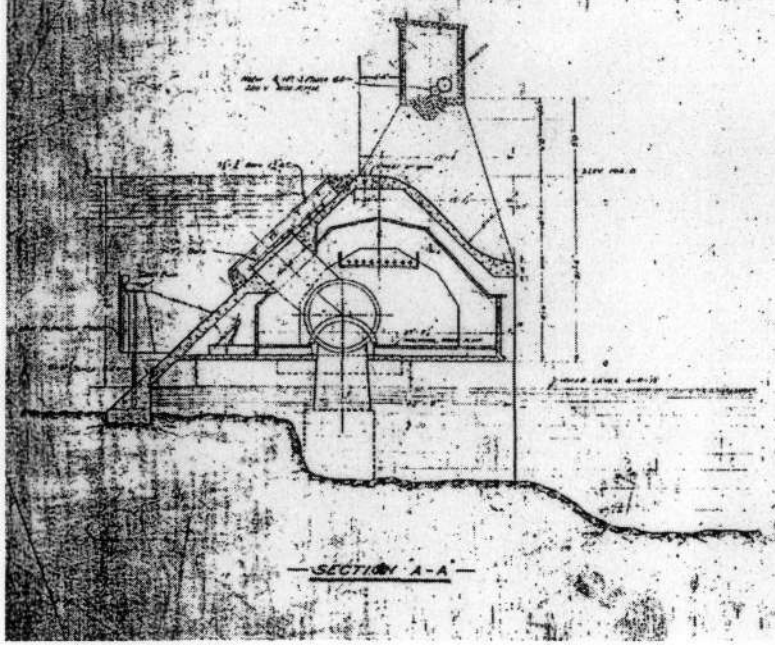

D-106101
1932 Property Plat
BA-1587, Bloede's Dam
Patapsco Valley State Park
Baltimore County
Paula S. Reed & Associates, Inc.
February 2011
Request Item 13
Privilege No. P.2
Deeds of Purchase
Bloede's Dam
PRESENT LOCATION OF THE BALTIMORE & OHIO RAILROAD
FORMER LOCATION OF THE BALTIMORE & OHIO RAILROAD
PATAPSCO RIVER
BALTIMORE COUNTY
HOWARD COUNTY
TUNNEL
Face of Tunnel
Area in Acres Land in Baltimore County. 16.40
Area in Acres Land in Howard County. 19.70
Total Area in Acres Owned 35.10
Total Area in Acres in use 10.60
PROPERTY PLAT
LOCATION OF BLDGS. AND DEED DATA
ILCHESTER.
CONSOLIDATED GAS ELECTRIC LIGHT AND POWER CO OF BALTIMORE, MD.
101901-D



— PLAN VIEW of MACHINE ROOM —

DESCRIPTION OF DAM

Reinforced concrete dam - designed and built by Ambursen Hydraulic Construction Company -
Footings carried to rock:
Spillway parabolic
Stream face of dam: 18" slab at base - tapering to 10" at crest
Buttresses about 18" thick on 10' centers
Overall width of dam, edge of spillway to heel of batter wall = 47'
Length of spillway between wing walls of end buttresses = 165'2"
Length of Power House inside dam = 105'8"
Portholes on downstream face 22" diameter
Length of dam between end walls = 196'2"



— SECTION A-A —

1932 Floor Plan & Section
BA-1587, Bloede's Dam
Patapsco Valley State Park
Baltimore County
Paula S. Reed & Associates, Inc.
February 2011

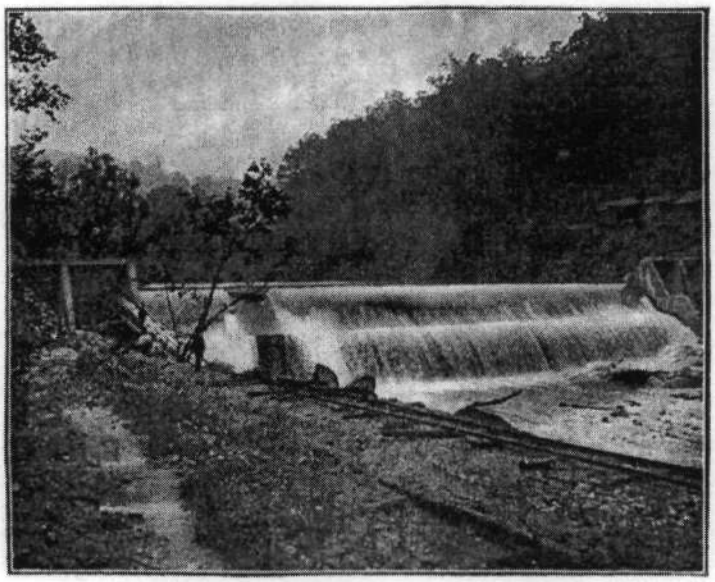


FIG. 317.—PATAPSCO DAM, ILCHESTER, MARYLAND.

Figure 1: Photo of Bloede's Dam from J. D. Schuyler Reservoirs for Irrigation, 1908 (p. 476).

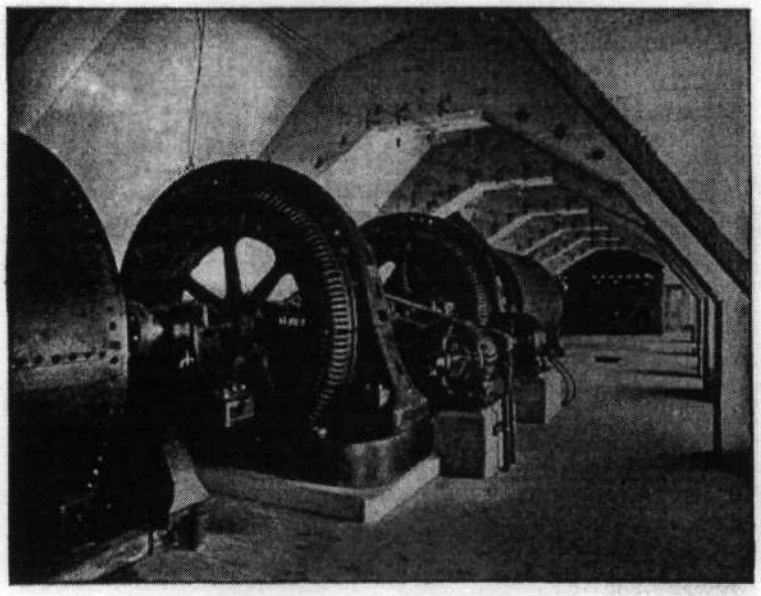


FIG. 319.—INTERIOR OF PATAPSCO SUBMERGED POWER-HOUSE.

Figure 2: Bloede's Dam powerhouse machinery (Schuyler 1908, p. 476)

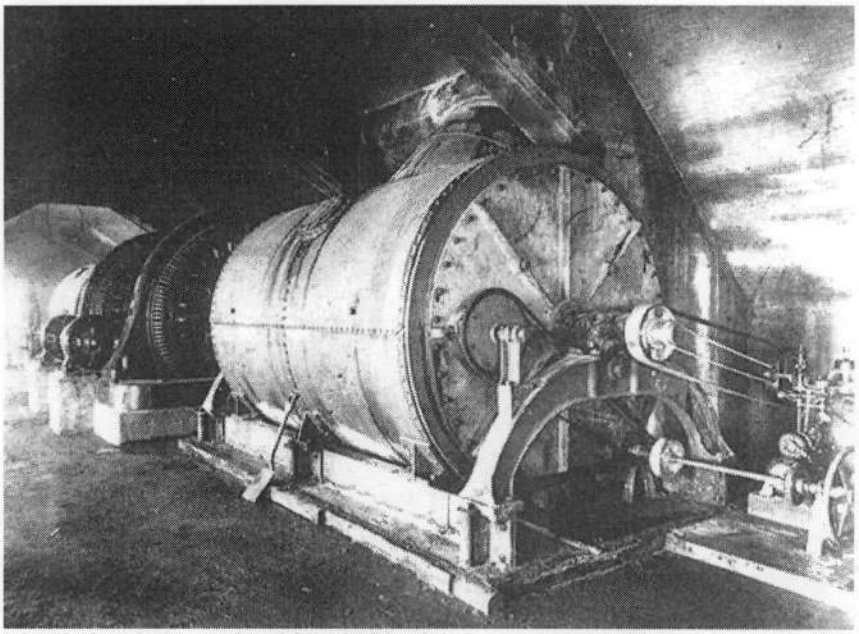


Figure 3: Undated photo of turbines in Bloede's Dam powerhouse (Baltimore Co. Library)

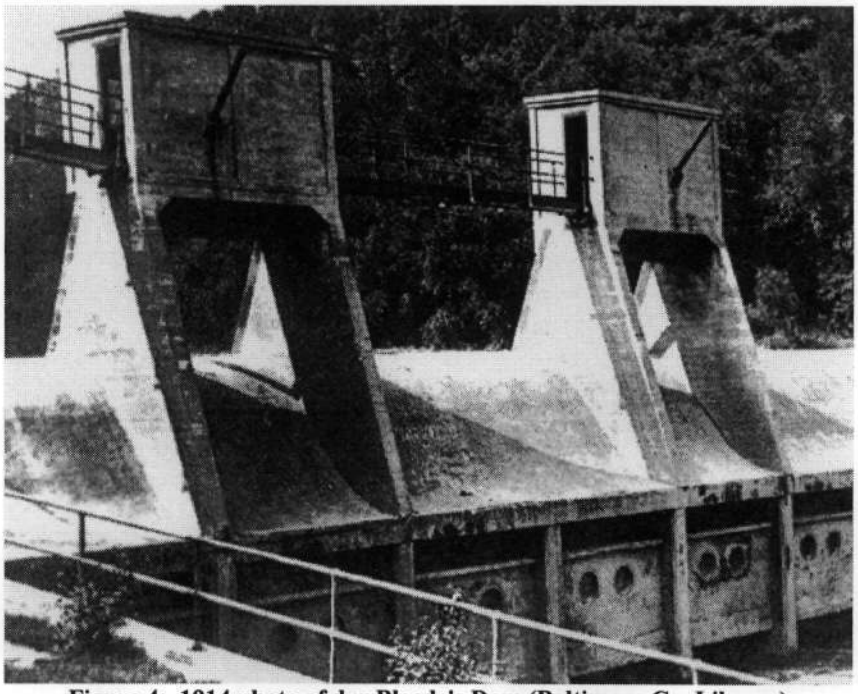


Figure 4: 1914 photo of dry Bloede's Dam (Baltimore Co. Library)

Figure 5: Victor Gustav Bloede (Baltimore Co. Library)

BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co., MD
Paula Reed
January 2011
MDSHPO

Dam and fish ladder (left side of photo), view NW from Howard Co. bank side

1/12

BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co., MD
Paula Reed
January 2011
MDSHPO
Dam and fish ladder (lower front of photo), view N from Howard Co. bank side

2/12

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Bloede's Dam
Patapsco Valley State Park
Baltimore Co., MD
Paula Reed
January 2011
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Dam + fish ladder (left and center of photo), view W along Howard Co. bank side

4/12

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Blocde's Dam
Patapsco Valley State Park
Baltimore Co., MD
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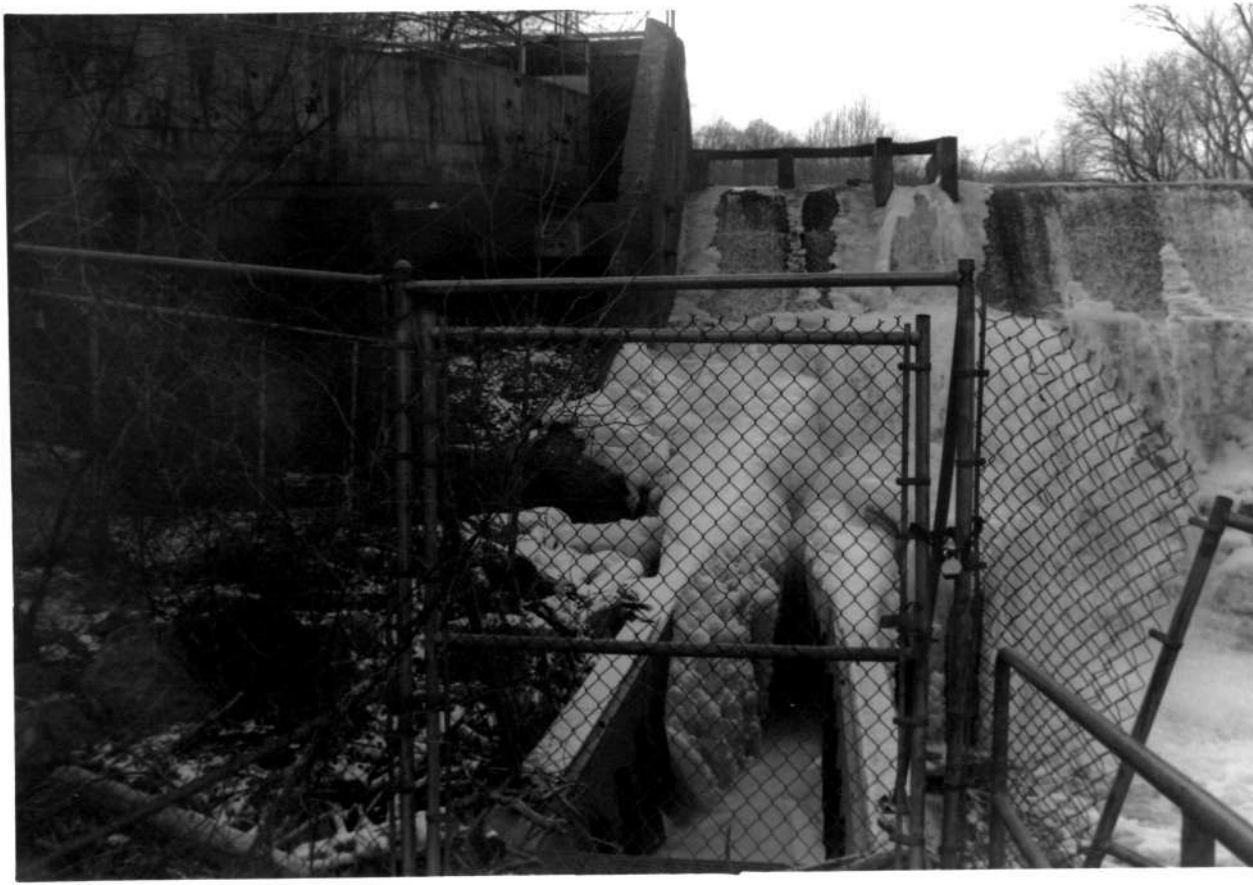
January 2011
MDSHPO

Dam, view NE from upriver on Howard Co. bankside

3/12

BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co., MD
Paula Reed
January 2011
MDSHPO
Dam + fish ladder (foreground), view NW from Howard Co. bank side

5/12



BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co., MD
Paula Reed
January 2011
MDSHPO

Detail of fish ladder entrance/exit (center and upper left of photo), view W on Howard Co. bank side

6/12

BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co., MD
Paula Reed
January 2011
MDSHPO
Detail of dam curtain and lower pool, view NW
from Howard Co. bank side

7/12

BA-1587
Blocde's Dam
Patapsco Valley State Park
Baltimore Co, MD
Paula Reed
January 2011
MDSHPO
Dam and concrete conduit on Baltimore Co. bank side, view N from Howard Co. bank side.

8/12

BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co, MD
Paula Reed
January 2011
MDSHPO
Detail of fish ladder (upper section) and Howard Co. bankside dam structure, view W.

9/12

BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co, MD
Paula Reed
January 2011
MDSHPO
Detail of dam concrete structure, Howard Co bank side

10/12

BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co, MD
Paula Reed
January 2011
MDSHPO
Detail of steel door at Howard Co. bank side entrance to dam interior.

11/12

BA-1587
Bloede's Dam
Patapsco Valley State Park
Baltimore Co, MD
Paula Reed
January 2011
MDSHPO
Dam interior, view N through Howard Co. bank side door

12/12

PATAPSCO STATE PARK, DEPT. OF NAT. RES. INV. NO. (none) BA-1587

MARYLAND HISTORICAL TRUST MAGI# 0315873715

INVENTORY FORM FOR STATE HISTORIC SITES SURVEY

1 NAME

HISTORIC
Bloede's Dam/Patapsco Dam

AND/OR COMMON
Bloede's Dam

2 LOCATION

STREET & NUMBER
On Patapsco near Avalon, 15 mi. below Balto. on the B&O

CITY, TOWN — CONGRESSIONAL DISTRICT

__ VICINITY OF

STATE — COUNTY
Balto. County/Howard County

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	__OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	X UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	__TRANSPORTATION
		__NO	__MILITARY	X OTHER: abandoned

4 OWNER OF PROPERTY

NAME
Maryland Department of Natural Resources Telephone #:

STREET & NUMBER
Taylor Avenue

CITY, TOWN — __ VICINITY OF — STATE, zip code
Annapolis Maryland 21401

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC.

Liber #:
Folio #:

STREET & NUMBER

CITY, TOWN — STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
cf. McNamara, p. 48

DATE

__FEDERAL __STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS

CITY, TOWN — STATE

BA-1587

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
_EXCELLENT	XDETERIORATED	XUNALTERED	XORIGINAL SITE
_GOOD	_RUINS	_ALTERED	_MOVED DATE_____
_FAIR	_UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

Bloede's dam is a flat slab reinforced concrete buttress dam of the half-apron type spanning the Patapsco River between Baltimore and Howard counties upstream from Relay, Maryland. It is 220 feet long, 40 feet wide at the base, 26 1/2 feet from normal tail water to the crest. At either end the buttresses and deck are 10 feet above the spillway, which is 168 feet long. The deck is supported by 19 buttresses which taper from a thickness of 24 inches at the base to 16 inches at the top. The shell of the dam varies from a thickness of 18 inches at bottom to 10 inches at the top. Below the half-apron are windows (beneath the overflow). Original equipment included two 34-inch Leffel waterwheels with Woodward governors, turbines running at 240 rpm, direct-connected to Allis-Chalmers 300 kw, 1,000 volt, three-phase 60-cycle alternators. Space was provided for an additional system of this kind.

(Data from Electrical World.)

CONTINUE ON SEPARATE SHEET IF NECESSARY

BA-1587

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW				
__PREHISTORIC	__ARCHEOLOGY-PREHISTORIC	__COMMUNITY PLANNING	__LANDSCAPE ARCHITECTURE	__RELIGION	
__1400-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	__SCIENCE	
__1500-1599	__AGRICULTURE	__ECONOMICS	__LITERATURE	__SCULPTURE	
__1600-1699	__ARCHITECTURE	__EDUCATION	__MILITARY	__SOCIAL/HUMANITARIAN	
__1700-1799	__ART	X ENGINEERING	__MUSIC	__THEATER	
__1800-1899	__COMMERCE	__EXPLORATION/SETTLEMENT	__PHILOSOPHY	__TRANSPORTATION	
X 1900-	__COMMUNICATIONS	__INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)	
		__INVENTION			

SPECIFIC DATES 1906 BUILDER/ARCHITECT Amburson Hydraulic Constr.Co.

STATEMENT OF SIGNIFICANCE

Bloede's Dam, built in 1906 by the Patapsco Electric and Manufacturing Co. of Ellicott City[1] and named for the company's president, Victor G. Bloede, represents a milestone in construction technology. Not only was it among the earliest reinforced concrete dams built in the United States[2], it was the first to take advantage of the technique to house electricity-generating machinery in its hollow interior. This solution was the only one which would satisfy the requirements of the available site (the entire width of the river was needed for the overflow wier) and the financial abilities of the company.

The dam was designed and built by the Amburson Hydraulic Construction Company of Boston, with H. von Schon of Detroit consulting hydraulic engineer and Messrs. Newton and Painter of Baltimore as electrical engineers. Bloede's dam was also believed to be of the minimum height required for such an operation, and all subsequent like endeavors were apparently larger.

The plant was built to replace the one then operating at Gray's Mill, a plant with a 680 hp capacity (380 hp were water power), which was used as a substation after Bloede's dam began its operations.

Bloede's dam produced electricity for years. The machinery was removed in

The superstructures were destroyed in Hurricane Agnes (1972).

---

[1]Ultimately part of Baltimore Gas and Electric.

[2]Reinforced concrete dams were introduced to the Eastern U.S. in 1902 by Amberson Hydraulic Construction Co. of Boston, which still held the patents on the techniques in 1909 (Schuyler, p. 465).

CONTINUE ON SEPARATE SHEET IF NECESSARY

BA-1587

9 MAJOR BIBLIOGRAPHICAL REFERENCES

Baltimore Gas and Electric News, "Improvements at Ilchester", Vol. 5, No. 4, pp. 157-160

CONTINUE ON SEPARATE SHEET IF NECESSARY

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

Electrical World, Vol. L, #5, pp. 207-210. August 3, 1907

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	COUNTY
STATE	COUNTY

11 FORM PREPARED BY

NAME / TITLE

John Hnedak, Historic Sites Survey Team Captain

ORGANIZATION — DATE

Maryland Historical Trust — 1978-79

STREET & NUMBER — TELEPHONE

21 State Circle — 269-2438

CITY OR TOWN — STATE

Annapolis — Maryland 21401

The Maryland Historic Sites Inventory was officially created by an Act of the Maryland Legislature, to be found in the Annotated Code of Maryland, Article 41, Section 181 KA, 1974 Supplement.

The Survey and Inventory are being prepared for information and record purposes only and do not constitute any infringement of individual property rights.

RETURN TO: Maryland Historical Trust
The Shaw House, 21 State Circle
Annapolis, Maryland 21401
(301) 267-1438

BA-1587

Electrical World
August 3, 1907

BLOEDE'S DAM
(PATAPSCO DAM)

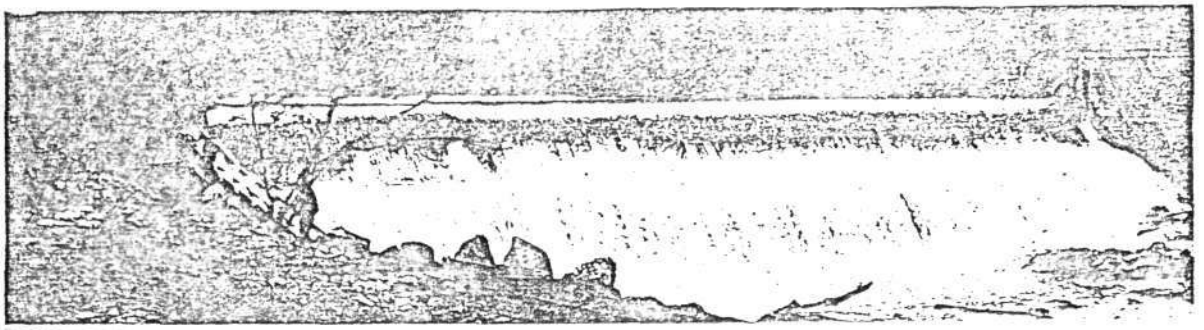


FIG. 1.—DAM ACROSS THE PATAPSCO RIVER NEAR ILCHESTER, MD., WITHIN WHICH THE POWER PLANT IS PLACED.

Power Plant Inside of a Dam on the Patapsco River.

THE Patapsco Electric & Manufacturing Company, of Ellicott City, Md., has lately completed its new dam and power house on the Patapsco River near Ilchester, some 15 miles or more below Baltimore on the Washington Branch of the Baltimore & Ohio Railroad. The plant is unique in that it is placed within the dam and is thus completely under water. The plant also has the distinction of being the first of its kind ever built, and the cost is of course very much less than that of any other arrangement. A view of the dam within which the power plant is placed is shown in Fig. 1.

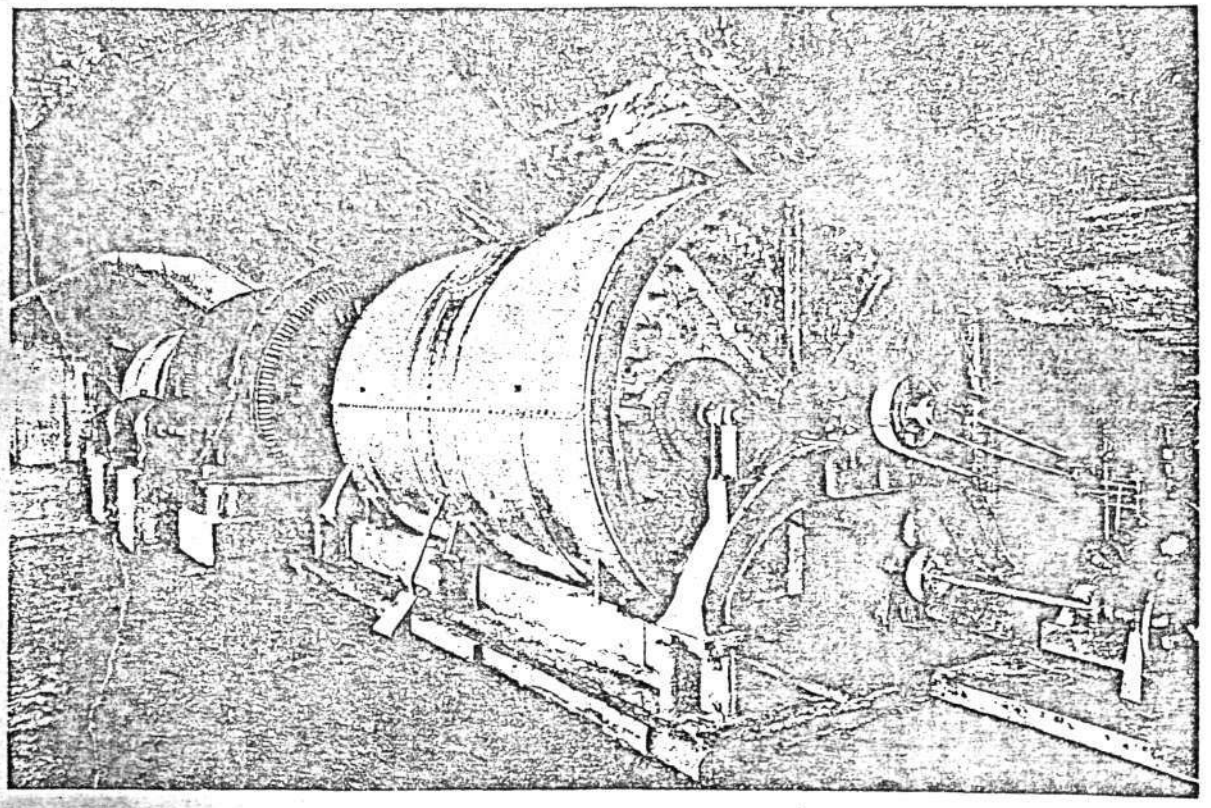


FIG. 2.—INTERIOR VIEW OF THE DAM, SHOWING THE ELECTRICAL GENERATING APPARATUS INSTALLED.

THE DAM.

The dam has a total length of 220 ft. and is 40 ft. wide at the base. The height of the dam from normal tail water to the crest is 26½ ft. At each end the buttresses and deck of the dam rise 10 ft. above the spillway as a protection from floods and to afford convenient entrances to the interior of the dam. The spillway is 168 ft. long and is provided with anchor bolts so that if at any time it may be deemed desirable, flash boards may be bolted to them and the available head increased two feet. The back water extends ¾ of a mile with an average width of about 500 feet to the tail waters of a cotton mill located at Ilchester. The dam is built of reinforced concrete and the "deck" is supported by 19 buttresses 24 ins. thick at the bottom and 16 ins. thick at the top, which are placed 12 ft. apart. The mixture used was 1 : 3 : 6. The edges of the buttresses and of the openings are reinforced with ¾-in. corrugated iron rods in groups of three. The shell of the dam is 18 ins. thick at the bottom and tapers to 10 ins. at the top. The concrete in the deck is a 1 : 2 : 4 mixture reinforced with ¾-in. corrugated iron bars at graduated distances down to 4½-in. centers. The apron extends only half way down from the crown, the remaining down-stream portion being entirely open and provided with windows by means of which the interior is lighted. The shape of the apron is such that the water is thrown some little distance away from the windows. On a clear day the illumina-

tion is all that could be desired; while during rainy weather, at which time the water is muddy, the illumination is not quite so good. The view of the interior of the power house shows how much light is received through the windows beneath the falls.

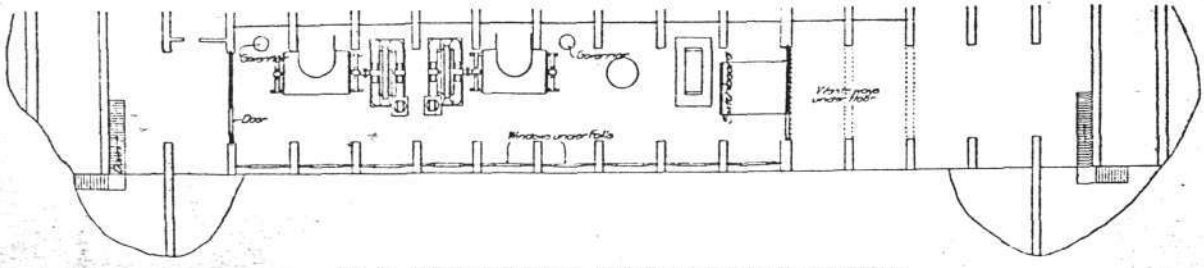


FIG. 3.—PLAN VIEW OF DAM, SHOWING LAY-OUT OF MACHINERY.

At present only 108 feet of the dam is used for housing the power plant. This part of the dam is fitted with a false ceiling hung five feet from the inside of the dam so as to protect the apparatus from any water that might seep through the outer shell of the dam. The dam is built of a fine and rich mixture which was laid very wet. Aside from this no precautions were taken to eliminate water. The ceiling slopes until it reaches the vertical sides forming the power house. That portion of the dam not protected with the false ceiling is comparatively dry as very little water percolates through. What little water finds its way through the concrete trickles along the under side to the drain at the bottom. Were it not for this moisture a person within the power house would not be conscious that he was beneath the water. The waste water going over the crest of the dam is carried on the apron of the spillway to within 16 ft. of the tail water. This apron causes the water to fall about 20 ft. from the down-stream side of the dam and as the river bed is quite rocky at this point, no appreciable pitting takes place.

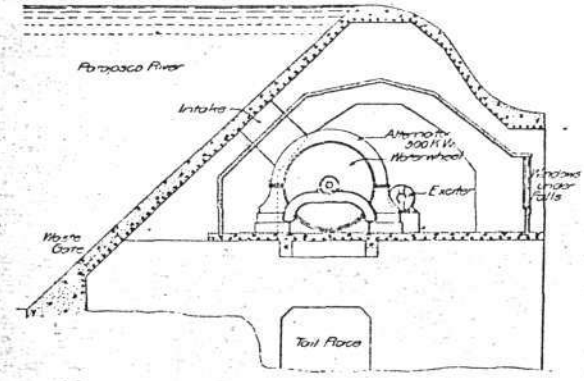


FIG. 4.—CROSS-SECTIONAL ELEVATION OF DAM.

A fish ladder is placed at one side of the dam as required by law. This is 125 ft. long and has the proper slope and fins so that fish can easily go from the tail water to that above the dam. The wooden trough is shown at the entrance to one side of the dam. It might be well to state in passing that the reason for insisting on fish ways in dams is that when the fish spawn they go up stream to the head waters. To reach the waters above the dam they jump from fin to fin of the fish ladder until they reach the top.

POWER PLANT.

The power plant equipment consists of two 34-in. horizontal, Leffel water-wheels fitted with Woodward governors arranged so that either governor may control both wheels when the generators are operated in parallel. Each turbine runs at a speed of 240 r. p. m. and is direct-connected to an Allis-Chalmers 300-kw, 11,000-volt, three-phase, 60-cycle alternator. Space has been provided for an additional unit of the same capacity.

Each alternator is provided with a 125-volt exciter belted to the shaft. The part of the dam used as a power house is 108 ft. long, 10 ft. high and 27 ft. wide except at the buttresses where the width is 18 ft. The arrangement of the machinery is well shown in the engravings and in the plan and cross-sectional elevation of the dam. A concrete-steel floor is placed at a proper elevation above the lower pool between buttresses, the latter being increased in section below the floor. The hollow interior structure is built upon this floor, as indicated in Fig. 4.

The water is fed to the turbines through steel pipes passing through the up-stream spillway shell and discharged by draft tubes into the base of the dam, dropping into a well sunk some three feet below the river bed. The water passes thence by way of a channel constructed in the river bed, out of the dam. The intake is 5½ ft. below the crest of the spillway so that the trash racks are kept clear of drift wood, etc. The trash rack is 10½ ft., and the flumes to the turbines 7 ft. in diameter. Two waste gates are placed near the bottom of the dam, the water from these passing under the floor. The flow through the feed pipe is controlled by a valve operated from the turbine chamber.

The mechanism for operating this valve is shown to the right in Fig 2. The advantages of such an arrangement of water-wheel and generator are readily discerned. The dam foundation and structure are the power house; the chamber is free from moisture by reason of the free circulation of air around it and the development utilizes all the available fall.

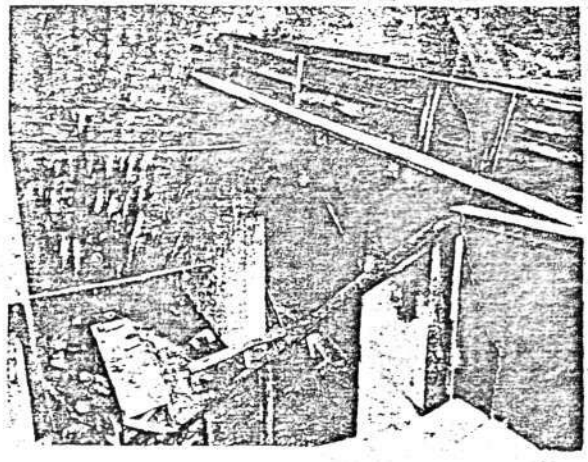


FIG. 5.—ENTRANCE TO POWER HOUSE, SHOWING FISH LADDER PASSING THROUGH.

The entire electrical installation is compact, secure, and of the highest efficiency so far as it can be obtained from flow and fall. It will be appreciated that the water falls directly through the top of the dam into and through the wheels below, thus avoiding the friction and other losses of power resulting from carrying the water through long race ways to the wheels.

The difference between the present system and those already in vogue may be likened to direct-driven and belt-driven machinery. The actual saving in power or what amounts to the same thing, the greater efficiency of the water will be approximately equal to the difference between belt and direct-drive.

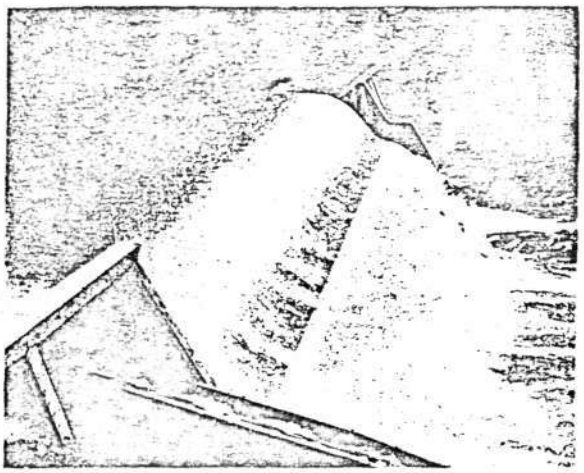


FIG. 6.—SIDE VIEW OF DAM, SHOWING THE THROW OF THE WATER FROM APRON.

The switchboard, which is located at one end of the power house, was built by the General Electric Company and is fitted with instruments, as shown in Fig. 9. As the exciters are arranged to be operated in multiple an automatic regulator is used for controlling the voltage of the generators. Polyphase indicating wattmeters have been provided: one for indicating

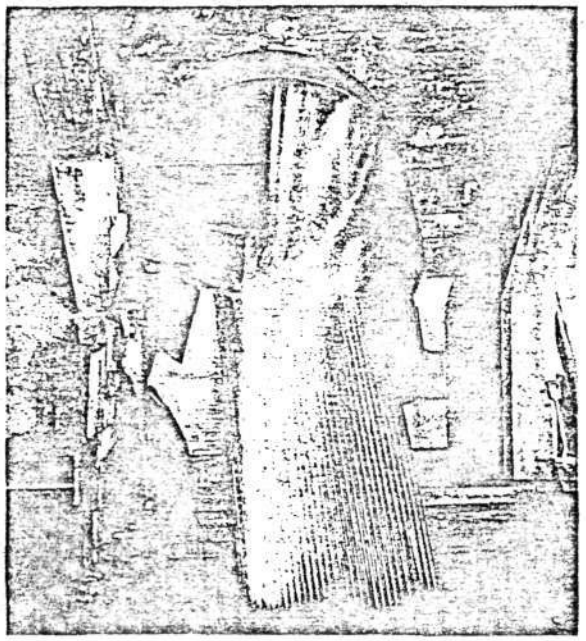


FIG. 7.—INTAKE FOR ADDITIONAL UNIT, SHOWING SUBMERGED RACKS IN THE UP-STREAM SIDE OF DAM.

the street service and the other the total load. A polyphase curve-drawing wattmeter is also used for recording the total output of the station.

The leads to the generators and for the commercial and street feeders are fitted with distant control, oil circuit-breakers, with disconnecting switches. The circuit-breakers for the generators have time limit relays so that in case of trouble on the outside feeders, they will not open before the others. The switchboard is arranged so that there is no danger of shock to the operator at the board. The voltage at the board does not exceed 125 volts, as the circuit-breakers, disconnecting

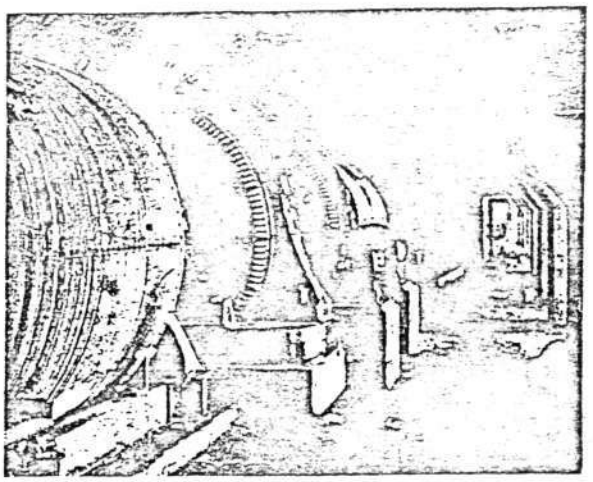


FIG. 8.—INTERIOR OF DAM, SHOWING LIGHT RECEIVED THROUGH WINDOWS UNDER THE FALLS.

switches, high-tension bus-bars, transformers, etc., are placed about eight feet from the front of the board with plenty of room for persons to make the necessary repairs without danger of coming in contact with high-voltage apparatus. The transmission lines cover such a large territory, that it was decided to use 11,000 volt alternators in place of stepping up the potential by means of transformers.

When the plant is completed it will supply electricity for both lamps and motors. At present Ellicott City, Catonville, Irvington, Carroll, Halethrop, Arbutus, St. Denis, Elkridge and a part of West Baltimore are being supplied from the plant near Grays Mills. The territory covered is about six by ten miles and there is a considerable day load for that section of the country, about 250 horse-power. It is intended to extend the lines to West Arlington and Mount Washington, a distance of about 14 miles, when the new plant is delivering electricity. The old plant near Grays Mills has a capacity of 680 horse-power of which 380 horse-power is generated by water. The

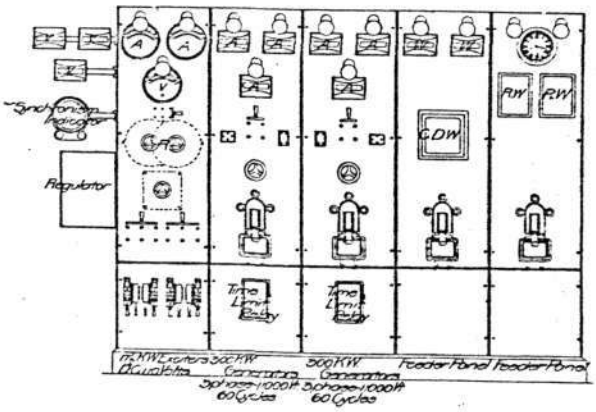


FIG. 9.—ELEVATION OF SWITCHBOARD.

electrical apparatus at this plant consists of one 240-kw Stanley generator and one 150-kw Allis-Chalmers generator. Both generators are wound for 2200-volts, two-phase, 60-cycles and transformers are used to step the potential up to 11,000 volts. At Catonsville, Wilkins Avenue and Beachfield Road, Wilkins Avenue and Roland Road and at the city limits transformers

are located for reducing the potential for distribution circuits. These are 2200-volt, single-phase lines except near the city limits, where, because of large motors installed, three-phase current is used. After the new station is in operation, it is the intention to use the old power house as a sub-station, as it is from this station that the different lines radiate.

Mr. Victor G. Bloede is president and general manager of the company and Mr. Otto Wonder is its superintendent. The designer and builder of the dam was the Ambursen Hydraulic Construction Company, of Boston, and H. von Schon, of Detroit, Mich., was the consulting hydraulic engineer. Messrs. Newton and Painter, of Baltimore, were the electrical engineers. The submerged power house was in this case the only feasible method of development on account of the available location and limitations of cost. A dam of this height is said to be the smallest that is available for a power house of this construction. At heights of from 40 ft. upwards details of submerged power houses, it is claimed, can be worked out to advantage and without the difficulty of restricted space.

Decorative Lighting in Philadelphia During the Elks' Carnival.

The annual reunion of the Elks, held in Philadelphia during the week July 15-20, was the occasion for what was probably the most elaborate civic electrical display ever made in this country, excluding, of course, world's fairs and similar exhibitions.

The response of Philadelphia merchants to the solicitations of the Elks' special convention committee, the advertising and solicitation of the Philadelphia Electric Company, and the general all-around booming and hurrah of the Philadelphia newspapers was beyond all expectation. Philadelphia arose to the opportunity of self-advertising, and at the same time gave a display of a public and progressive spirit which has rarely been equaled upon occasions of this sort. The display of bunting, flags, emblems and other daylight effects was most elaborate and costly. The main business streets and many of the streets in the outlying districts were fairly ablaze with color, but overtopping all else was the lavish electrical display—a display which attracted scores of thousands of people to the business district every night during the week. It was an example of the efficacy, the compelling power of electrical advertising, without which no business street in a large city can ever hope to obtain its full share of trade.

It may be of interest to know just what method was pursued by the Philadelphia Electric Company to do its share toward working up public interest, in making an electrical display which resulted in such a notable exhibit. Many weeks prior to the convention the solicitors of the company were started out upon the labor of interesting its customers, particularly the retail stores and the large department stores, in the matter of individual electrical display. This work was preliminary, the idea being merely to arouse interest and not to close contracts at that time.

Three weeks prior to the convention, the columns of the daily newspapers of Philadelphia were used for a specially prepared series of advertisements bearing directly upon Elks' week. This series is reproduced elsewhere in this issue. The copy used aimed to arouse civic pride and enthusiasm in the influx of several hundred thousand visitors and the necessity for advertising Philadelphia as well as its business houses by elaborate preparations in the decorative line, and calling attention to the fact that the electrical way was the only effective way.

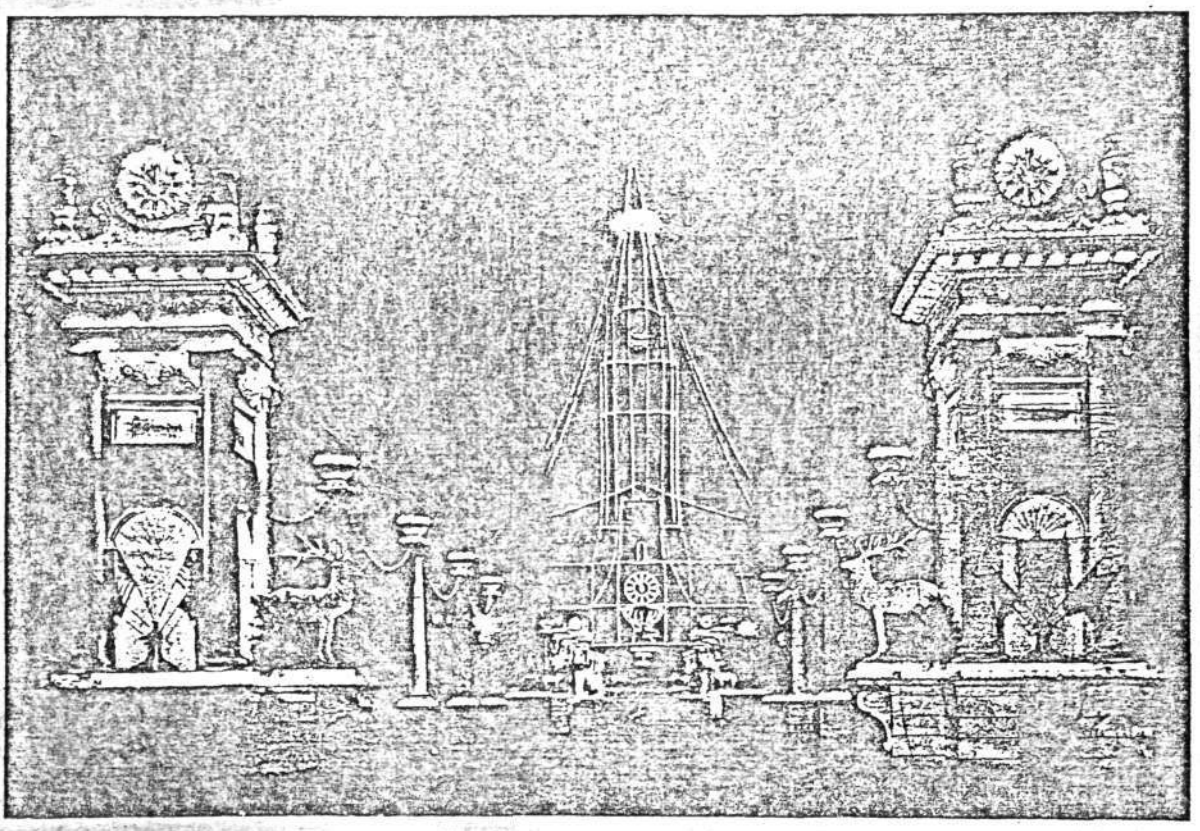


FIG. 1.—COURT OF HONOR ON NORTH BROAD STREET, LOOKING TOWARDS THE CITY HALL.

The interest of the newspapers was obtained and they inserted frequent notes regarding the proposed electrical features of the convention. As a result, some days before the convention, it was impossible to obtain any more electrical devices

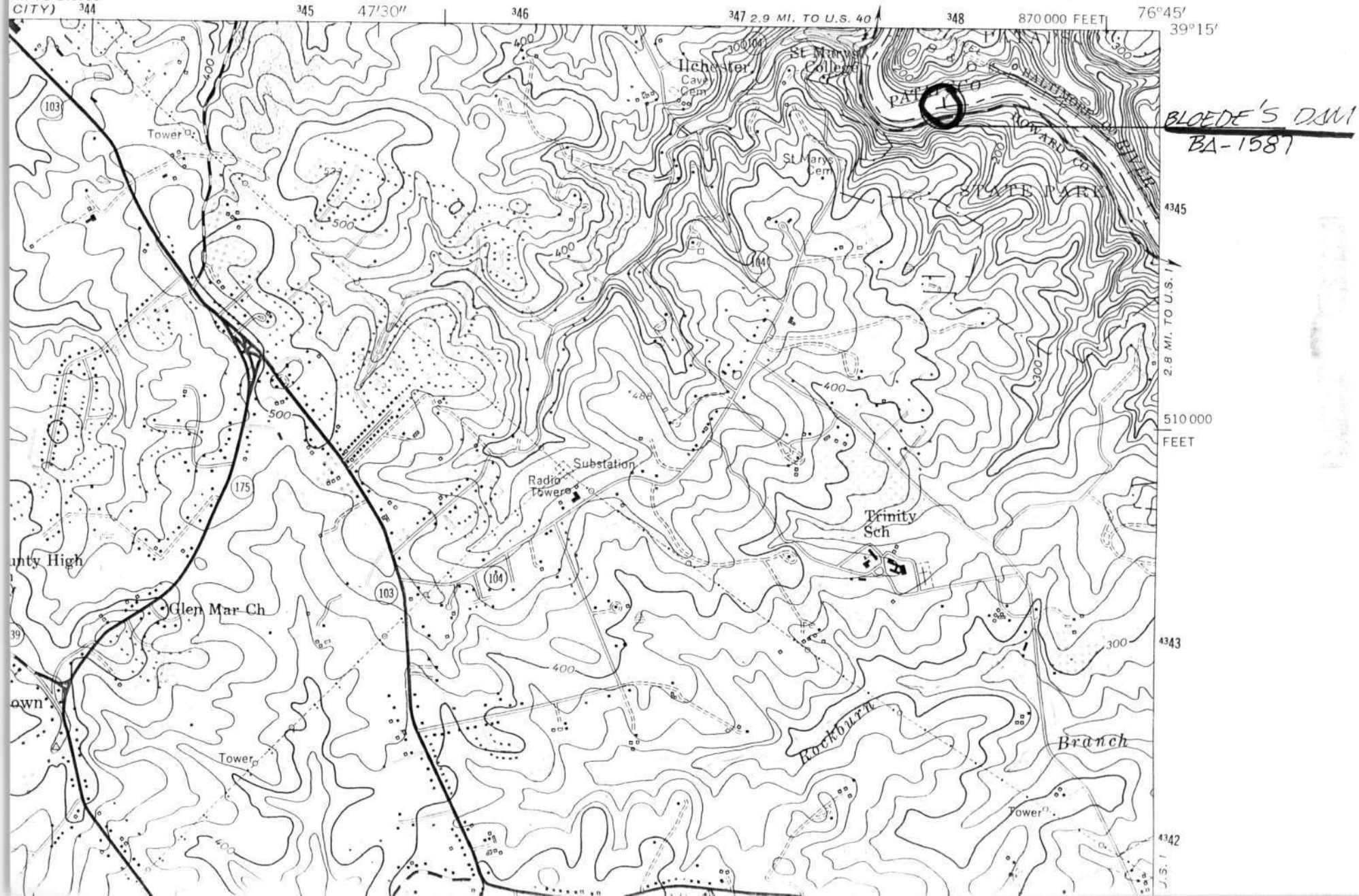
SAVAGE QUADRANGLE

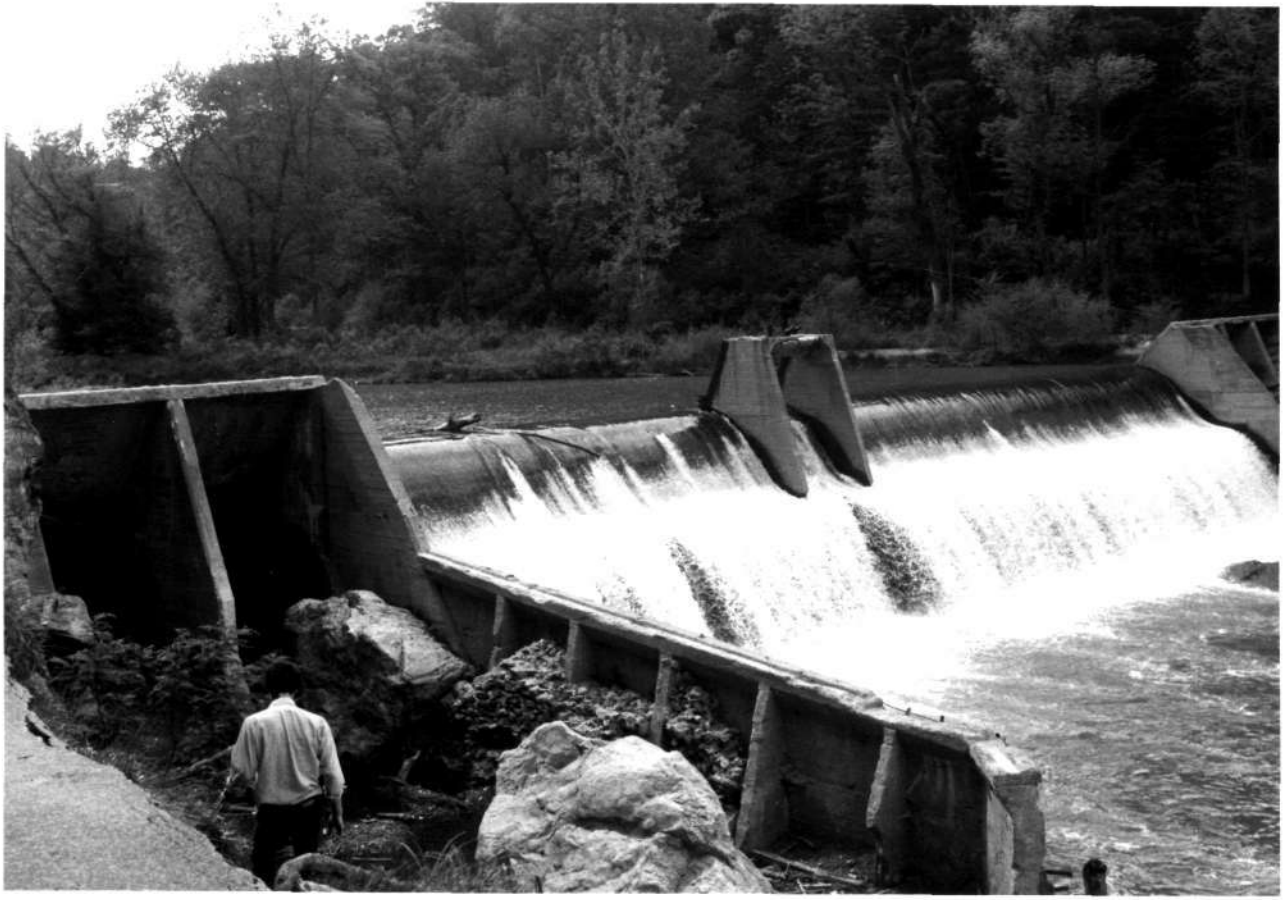
MARYLAND

7.5 MINUTE SERIES (TOPOGRAPHIC)

NE/4 LAUREL 15' QUADRANGLE

5662 I SW
(BALTIMORE WEST)





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